Conclusion. Focal infections are commonly met with in cases of arthritis deformans, which, when corrected surgically, do not actually benefit the chronic cases, although it may be striking in results in arthritis of only a few weeks' or months' standing.

The tonsils are the most often affected, the teeth next and other sites less frequently. The colon, however, was the commonest source of infection of them all, the organisms met with in order of frequency being the Bacillus aërogenes capsulatus, diplo- and single Gram-positive cocci, Bacillus putrificus, pathogenic types of Bacillus coli communis, staphylococci and streptococci.

On the basis of what can be estimated by blood chemistry today there is no reason to believe that arthritis deformans is due to constitutional errors, a view commonly held, particularly by the older clinicians. It is far more logical to believe that the condition in each instance is due to focal infection somewhere in the body, the intestinal canal being the most frequent site.

Whatever manifest focal infection is found should be treated surgically, and when no benefit is noted, complete examination of stools and urine are in order because treatment directed here is well worth the trouble in the results probable of being accomplished.

Dieting according to the type of bacterial infection (toxemia) present in the gut and bacterial treatment commonly offers distinct benefit in the cases.

Constipation and debility should be corrected by diet and not by drugs.

There is no possibility of cure in the true sense, only benefit can be accomplished, and when this is sustained over lengths of time it represents the best that can be accomplished. Joints crippled by changes in the anatomy remain that way permanently.

There is good reason to believe that in the early course of this disorder if attention is given to the colon as well as to the other focal infections many would be saved a fate of chronic joint deformity and invalidism.

IMPROVEMENT IN GRAVES'S DISEASE SUBSEQUENT TO SEVERE FOCAL INFECTION.[1]

By Theodore L. Squier, M.D.,
ANN ARBOR, MICH.

(From the Department of Internal Medicine, University of Michigan Medical School.)

We have recently had occasion to study two patients with Graves's disease, both of whom manifested very great improvement subsequent to severe acute infection.

[1] I wish to express my thanks to Dr. Newburgh for the privilege of reporting these cases.

As is well known, many writers have repeatedly pointed out that infections of any sort may have a markedly deleterious effect upon the thyroid, and, indeed, infection has been given an important role in the etiology of Graves's disease.

Vincent,[2] for example, has reported that of 156 cases of acute rheumatic fever which came under his observation, 86, or 68.3 per cent., showed painful tumefaction of the thyroid gland which disappeared with the symptoms of rheumatism.

Billings[3] likewise has observed many instances of thyroid enlargement, usually of the chronic type, in which various focal infections were associated with evidence of thyroid intoxication.

Jennings[4] has reported two cases of measles occurring in patients with preëxisting Graves's disease. In one patient, in whom hyperthyroidism was marked, death resulted during the course of the measles. In the other hyperthyroid symptoms were mild, but the attack of measles so aggravated the condition of the thyroid gland that four weeks later surgical intervention was deemed necessary.

In those cases of Graves's disease which have come under our observation the appearance of an acute infection very commonly has led during the course of the infection to an exacerbation of all symptoms of thyroid disease. Accordingly the search for and elimination of focal infection has become an accepted routine in the medical treatment of this condition, and the improvement seen following the removal of such foci has frequently been striking.

With these facts in mind the occurrence of improvement as a result of infection seems at first thought to be paradoxical. However, as Beck[5] pointed out, one would expect the first effect of infection to be irritative, and hence productive of thyroid hyperfunction, and that later effects of the same infection may be degenerative changes leading to hypofunction. Indeed, Vincent[6] mentions one case in his series which would definitely fall in this category. Thyroid hypertrophy which had appeared in association with rheumatic fever gradually receded, so that at the end the gland was left sclerosed and atrophic. Several instances are cited by Beck[7] in which well-marked symptoms of thyroid insufficiency appeared following protracted acute infections. Hertoghe[8] feels that all infectious diseases of childhood and of later life fall heavily on the vitality of the thyroid gland. Similarly, Ord[9] states that often the

[2] Sur la Réaction Thyroïdienne dans le Rhumatisme Aigu et sur l'Origine Rhumatismale de certains Cas de Goitre Exophthalmique, Compt. rend. Soc. de Biol., 1907, lxiii, 389.

[3] Focal Infection, The Lane Medical Lectures, 1917, Appleton & Co., p. 103.

[4] Two Cases Showing the Effect of the Incidence of English Measles upon Pre-existing Graves's Disease, Lancet, 1918, i, 906.

[5] The Relation of Chronic Infection to Thyroid Deficiency, Southern Med. Jour., 1918, xi, 492.

[6] Loc. cit.

[7] Loc. cit.

[8] Thyroid Deficiency, Med. Rec., 1914, lxxxvi, 489.

[9] Myxedema, Tr. Clin. Soc., 1888, xxi, 298.

atrophy which results in myxedema is due to inflammatory destruction of the glandular tissue. Cases have been reported by Albo[10] and others in which influenza apparently precipitated symptoms of thyroid deficiency.

Whether or not the thyroid itself is actually invaded during infection can only be conjectured. That such invasion does take place is certainly not unlikely. McCallum[11] has suggested that infection reaches the thyroid from the pharynx and sets up in the gland a non-suppurative thyroiditis which destroys many of the cells and leaves scars through the gland, after which hypertrophy of the remaining tissue occurs. Gilbride[12] studied bacteriologically 14 operated cases of goiter, 6 of which were exophthalmic and 8 cystic in type. He succeeded in isolating Micrococcus tetragenous from one gland from the exophthalmic group, and from one gland from the cystic group he isolated Streptococcus vermiformis of Sternberg. Such study fails, however, to accurately represent the possible frequency of thyroid invasion. Operations are avoided during acute infection, and obviously it is during the period of active infection that we would expect the highest percentage of positive tissue cultures. It would be unwise to attach too much significance to the finding of Streptococcus vermiformis in the culture from one cystic gland, for the frequency with which this organism occurs as a contamination in tissue culture is well known.

We wish to present two cases of hyperthyroidism, both of which showed striking improvement following severe infection.

CASE I.—Mrs. C., aged forty-eight years, housewife, married, entered the hospital March 10, 1917, complaining of tumor in the thyroid region, palpitation of the heart and pain over the region of the ensiform. The family history was negative. She had never been pregnant, and until two years ago her menstruation was normal. At this time the flow became profuse and curettage was done. Save scarlet fever at twenty-two the past history was unimportant.

In the summer of 1916 she became very nervous and noticed a marked tremor of the hands which, during August, was so pronounced that she could scarcely handle dishes. She began to have drenching night-sweats, which persisted through the fall of 1916. On October 14 she became prostrated and would have fallen if someone had not supported her. She first noticed at this time a small enlargement in the thyroid region which had progressively increased in size until the time of her admission. She went to bed October 14 and remained there six weeks. For several weeks after getting up

[10] Postinfluenzal Thyroid Insufficiency, Progresos de la Clinica, 1919, vii, 122; Abst., Jour. Am. Med. Assn., lxxxiii, 157.

[11] The Pathology of Exophthalmic Goiter, Jour. Am. Med. Assn., 1907, xlix, 1158.

[12] Culture from the Thyroid Gland in Goiter, a Bacteriological Study, Jour. Am. Med. Assn., 1911, lvii, 1988.

she had attacks of pain under the sternum so severe that at times it was necessary to lie down. Tiredness, trembling and dyspnea

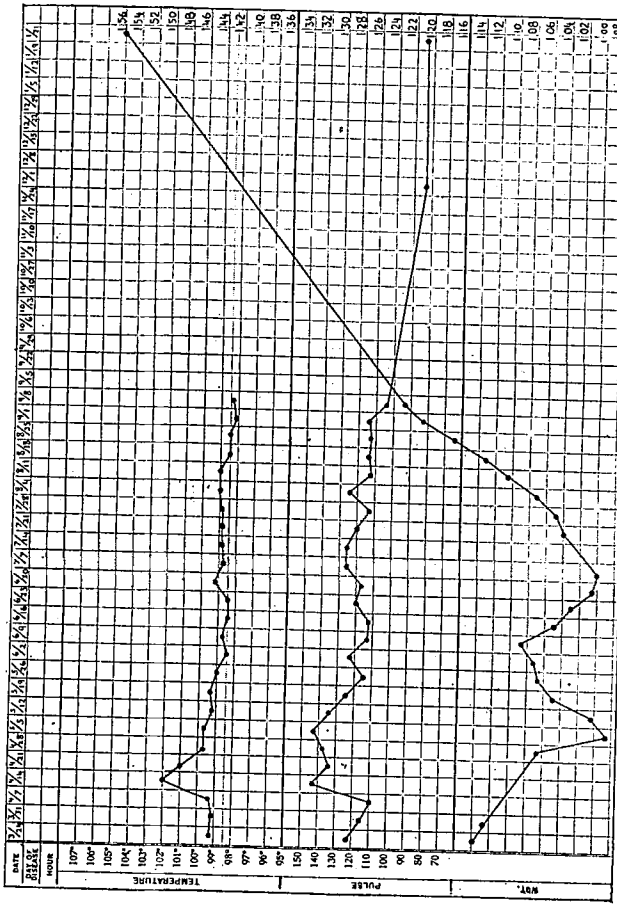


CHART I.—Case I. Chart showing temperature, pulse and weight by weeks. Average temperature and pulse readings for the period indicated are recorded.

were marked. There was no diarrhea and her appetite was quite variable. She had lost fifty pounds in the past year.

Examination March 13, 1917, showed a poorly nourished woman weighing 115 pounds. The skin was rather deeply pigmented throughout. Pupils were round, equal, rather widely dilated, but reacted normally. The palpebral fissures were widened and there was considerable lagophthalmos, together with failure of convergence. The forehead wrinkled normally on looking up. Scleræ and conjunctivæ were normal. The tongue protruded in the midline with marked tremor. Tonsils were slightly enlarged. There was slight bilateral enlargement of the thyroid gland. No thrill was noted, but a distinct bruit could be heard over both lobes. There was marked pulsation of the great vessels of the neck. Examination of the lungs revealed no abnormalities. The apex impulse of the heart was best felt in the fifth intercostal space in the midclavicular line. There was no enlargement to the right. The heart-rate was rapid and the sounds clear and forceful. No murmurs were heard. A-2 was greater than P-2. The abdomen showed nothing unusual. Except for a fine tremor on extending the fingers the extremities were negative.

The urine was negative. Blood-pressure, 155 to 85. Blood: red blood cells, 4,250,000; hemoglobin, 80 per cent.; white blood cells, 6800; differential count: neutrophile polynuclears, 69 per cent.; eosinophile polynuclears, 2 per cent.; small lymphocytes, 18 per cent.; large lymphocytes, 5 per cent.; transitionals, 3 per cent.; large mononuclears, 3 per cent.

She was placed in isolation, strictly confined to bed and given forced diet. By March 28 there had been no increase in her weight. On April 7 she complained of chilly sensations and her temperature was 101°. A few spots were seen in the posttonsilar region. There was some difficulty in swallowing solid food and she was placed on a liquid diet. Her white count at this time was 11,150. Throat culture was reported negative for Klebs-Loeffler bacillus. She grew rapidly worse, the tremor became very marked and she was excessively emotional there being some delusions. On April 15 respiration was of Cheyne-Stokes type, and there was considerable acetone in the urine. She was given sodium bicarbonate intravenously, and one hour following she had a chill lasting ten minutes. Throughout April 16 she was stuporous, but was easily aroused. She was slightly disoriented and there were involuntary bowel movements and incontinence of urine. The pulse was quite irregular, and she continued irrational on the 17th and 18th. By April 21 the tonsillitis had subsided. Blood culture taken April 13 was reported sterile on the 25th.

On April 28 the goiter had become smaller in size and had lost its hard feeling. Exophthalmos was somewhat less and lagophthalmos was absent. Nervousness was much diminished and she herself was conscious of improvement. During the week ending May 21 she gained five pounds, palpitation was less marked and the thyroid

gland was no longer palpable. She improved steadily until June 21, from which time her appetite became poorer and her weight, which had reached 108 pounds, had fallen by July 7 to 100 pounds, and she was quite depressed because of the apparent lack of progress. In the following week she began to improve again. July 14 she weighed 102 pounds; July 21 her weight was 104 pounds and on the 24th she was allowed to be up in a chair for the first time. She continued to gain weight, weighing 105½ pounds July 28, 107¾ August 4, 110 August 11, 113 August 18, 117½ August 26 and 120 September 1. At this time she felt fine and walked about the ward considerably. There had been but little diminution in the pulse-rate, but she no longer was conscious of palpitation. September 28 she weighed 122½ pounds and was discharged, feeling quite well. December 2, 1917, a letter from her stated that she was feeling perfectly well and her pulse averaged 85. On January 24, 1918, she returned for reëxamination. She said that since leaving the hospital she had felt fine and she herself was convinced that no signs of the disease remained. Her weight was 156 pounds and examination showed her neck and eyes to be perfectly normal.

CASE II.—C. O., aged twenty-three years, male, machinist, unmarried, entered the hospital October 9, 1919, complaining of nervousness, weakness, tachycardia, exophthalmos and tumor of the neck.

The family history was negative. At the age of thirteen he had a perforating injury of the right eye. From the age of ten to sixteen there was almost a constant succession of boils, which he stated were cured by vaccine.

In April, 1918, he had a severe sore-throat, lasting two weeks, which was accompanied by iregular chills and fever, but without joint symptoms. On May 6, while operating an electrical machine he received a severe shock, which threw him to the floor and caused him to lose consciousness for a period of five minutes. After a short rest he was able, however, to go on with his work. That night at the supper table he noticed a tremor of the hands so marked that he was unable to hold a glass of water steadily. For the next two weeks he continued to work, but there was a gradual increase of weakness and loss of strength, so that at the end of that time he was hardly able to climb a flight of stairs, and he had lost fifteen pounds in weight. Early in June he was called by his local draft board and rejected for army service because of "leakage of the heart." This worried him considerably, and upon the advice of his physician he remained in bed for a period of three months, but made little improvement. His weakness and nervousness increased, his eyes became more prominent and he steadily lost weight in spite of an exceptional appetite. He entered the hospital October 9, 1919.

Examination showed a fairly well-nourished young man weighing 115½ pounds. There was marked exophthalmos, definite lagoph-

thalmos and failure of convergence. The right pupil was pyriform in outline, but both reacted to light and accommodation. Tonsils were moderately enlarged and the postcervical glands were palpable. There was a uniform soft enlargement of both lobes of the thyroid, and over both lobes a thrill was felt and a two-way bruit heard on auscultation.

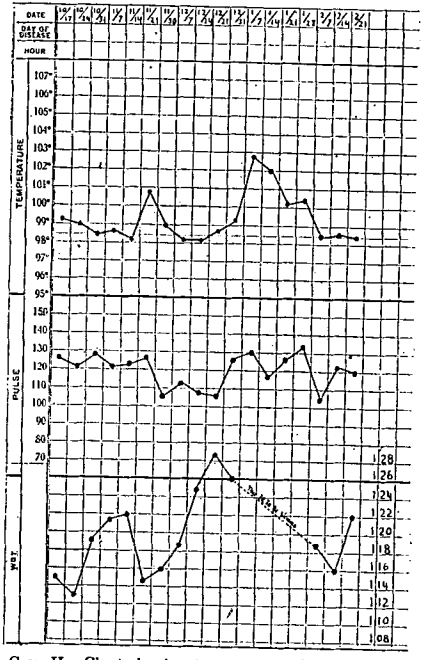


CHART II.—Case II. Chart showing temprature, pulse and weight by weeks. Average temperature and pulse readings for the period indicated are recorded.

The heart apex was in the fifth intercostal space inside the nipple line. The rate was rapid and regular, and a soft systolic murmur was heard best at the apex and was audible over the entire precordium, but was not transmitted to the axilla. A-2 and P-2 were about equal.

Chest and abdominal examinations were negative, and except for the typical fine tremor on extension of the fingers the extremities showed nothing of note. Blood-pressure 125 to 80; red blood cells,

4,080,000; hemoglobin, 75 per cent.; white blood cells, 9500. Differential: neutrophile polynuclears, 56 per cent.; eosinophile polynuclears, 1 per cent.; large lymphocytes, 36 per cent.; small lymphocytes, 7 per cent. Urine negative. Blood Wassermann negative. An orthodiagram at this time showed the round heart of chronic myocarditis with an area of 130 per cent.

Rest in bed and forced diet were ordered. After an initial loss of two pounds his weight remained practically stationary until October 26. In this period he had occasional attacks of epistaxis. He gradually gained weight from this time until November 9, when he weighed 123 pounds. Because of hypertrophied tonsils tonsillectomy was done November 11, following which a septic temperature developed. Upon examination an abscess was found just in front of the posterior pillar of the fauces, and this was lanced. After several days of hot saline irrigations the temperature fell to normal. A roentgen ray of the teeth showed an apical abscess of the left lower first molar, and on November 26 this tooth was extracted, following which his temperature again rose to 104.4°. On November 28 the thrill and bruit over the gland had both markedly increased in intensity and his weight was 115 pounds. At this time he also complained of pain in his right ear. On the 28th and 29th he had several attacks of epistaxis. In spite of these difficulties he gained a little, and on December 10 he weighed 122½ pounds. He continued to gain until December 24, when his weight was 129½ pounds. On January 2 he developed an acute rhinitis, accompanied by severe headache, earache and sweating. Mastoid tenderness appeared on the right side, and on January 5 a paracentesis was done. The ear drained freely and was subsequently treated with hot saline irrigations. On January 15 he had shown marked improvement, but the temperature still showed some fluctuations, the maximum being 100.8°. The signs of hyperthyroidism were markedly diminished: exophthalmos had decreased slightly the tremor of the hands was by no means so marked as previously and the thyroid enlargement had practically disappeared. There was marked pulsation of the great vessels of the neck, but no thrill could be felt, and there was no bruit. He continued to improve until January 22, when he contracted influenza. His temperature rose to 102° and he conplained of some stiffness of the right side of his neck. By January 28 his temperature had again returned to normal, and it remained so up to the time of his discharge. On February 5 exophthalmos was noted as being somewhat lessened, but lagophthalmos was still slightly evident. On February 10 lagophthalmos had practically disappeared. He was discharged February 21, there being at this time no neck signs save a very slight enlargement. He himself felt that the improvement in his condition was most striking. Following discharge he continued to improve, and on April 1 his weight was 185 pounds and he was feeling fine.

The course of these two cases makes it seem not unlikely that we have in them examples of infection, which either by direct invasion of the gland or by toxic action so affected the secretory tissue of the thyroid that subsequently the Graves's disease was very much improved. Whether this improvement can be regarded as the result of glandular exhaustion or actual loss of secretory tissue through damage is difficult to say. It would seem most probable that the latter explanation is the true one.

Summary. 1. As is well known, acute infections occurring during the course of Graves's disease usually cause a marked increase in the severity of all symptoms.

2. Sometimes, however, such infections apparently do injure the gland sufficiently to result in eventual alleviation of the condition.

3. Two cases of hyperthyroidism are cited in which complicating infections first caused a marked increase in the severity of the thyroid symptoms later followed, after the acute infection had subsided, by striking improvement if not cure. It is not improbable that the improvement seen is due to actual loss of secretory tissue through postinfectious sclerosis of the gland.

GLUCOSE TOLERANCE TEST IN CHRONIC VASCULAR HYPERTENSION.[1]

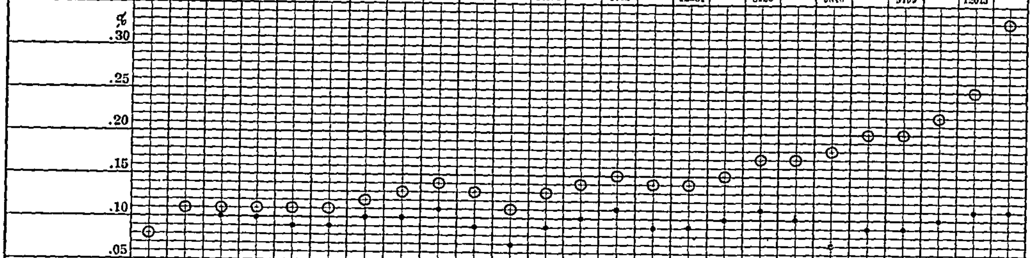
By James P. O'Hare, M.D.,
BOSTON, MASS.

(From the Medical Clinic of the Peter Bent Brigham Hospital, Boston Mass.)

I wish to present briefly in this paper the results of 25 glucose tolerance tests done on 23 cases of chronic vascular hypertension. Hopkins,[2] Hamman and Hirshman,[3] Janney and Isaacson[4] and others have shown clearly enough that patients with diabetes, nephritis and certain endocrine disturbances cannot handle glucose taken by mouth as well as normal persons. Patients with chronic vascular hypertension can hardly be regarded as diabetics or nephritics, and as yet no endocrine disturbance has been proved in them. They, too, may show a disturbance in handling glucose. This type of case is, of course, very similar to the nephritic with hypertension. The element of retention of glucose, however, which complicates the interpretation of the glucose tolerance test in the true nephritic, apparently does not occur in the true chronic vascular hypertension

[1] Read at the meeting of the New York Academy of Medicine, April 1, 1920.
[2] Am. Journ. Med. Sc., 1915, cxlix, 254.
[3] Arch. Int. Med., 1917, xx, 761.
[4] Jour. Am. Med. Assn., 1918, lxx, 1131.

MED. NO.	11603	12459	10349	11701	9799	7761	10661	12568	12450	12240	7608	11581	11704	8742	11529	12381	11725	8920	11143	9816	11200	9799	8076	12015	12775



GLYCOSURIA TEST IN	O	O	—	O	+	O	O	.63 ++	O	O	O	O	O	+	O	O	O	.3 ++	.4 ++	+	O	O	O	4.0 +++	2.0 +++
GLYCOSURIA AT OTHER TIMES	O	O	+	+	+	O	O	O	O	O	O	O	+	0.2 ++	O	O	O	O	+	+	1.5 ++	+	+	+	O
PHTHALEIN	65	55	55	54	62	89	64	50	55	69	76	50	54	70	72	40	52	68	50	55	56	62	44	55	65
B. U. N.	12	16	12	13	11	12	13	6	16	15	10	16	13	13	14	—	11	12	19	12	14	11	18	11	13
B. P.	185 100	186 100	240 135	190 120	190 80	180 120	188 112	250 150	186 100	224 100	260 112	260 120	190 80	278 140	194 100	225 140	280 130	216 124	190 115	264 150	230 130	190 80	214 128	175 105	208 108
ARTERIOSCLEROSIS	O	+	+	O	+	+	O	+	+	O	+	+	O	+	O	+	+	+	+	+	+	+	+	+	+